A complete listing of all claims ever presented follows in accordance with 37 CFR 1.121:

Complete Listing of Claims

Claim 1. (Withdrawn): A method of measuring air content in a sample fluid comprising:

determining a base volume change between zero or a negative pressure and a positive pressure in a chamber;

determining a sample volume change between zero or the negative pressure and the positive pressure in the chamber with a sample fluid; and

determining air content of the sample fluid by comparing the sample volume change and the base volume change.

Claim 2. (Withdrawn): The method of claim 1, wherein the chamber has an inlet valve, an outlet valve, and an assembly connected to a pressure source.

Claim 3. (Withdrawn): The method of claim 2, wherein the assembly comprises a cassette piston.

Claim 4. (Withdrawn): The method of claim 2, wherein the pressure source comprises a motor connected to the piston and generates negative pressure.

Claim 5. (Withdrawn): The method of claim 2, wherein the pressure source comprises a spring connected to the piston and generates positive pressure.

Claim 6. (Withdrawn): The method of claim 2, wherein the sample fluid flows into the chamber the pressure source generates negative pressure.

Claim 7. (Withdrawn): The method of claim 2, wherein the chamber is part of an infusion pump.

Claim 8. (Withdrawn): The method of claim 1, wherein the chamber is closed at the positive pressure.

Claim 9. (Withdrawn): The method of claim 2, wherein the inlet valve and the outlet valve are closed when the pressure source generates positive pressure.

Claim 10. (Withdrawn): The method of claim 3, wherein the determination of the base volume change and the sample volume change includes determining a position of the cassette piston.

Claim 11. (Withdrawn): The method of claim 10, wherein the determination of the position of the cassette piston includes using an optical position sensor.

Claim 12. (Withdrawn): The method of claim 1, wherein the determination of the base volume change is repeated for one or more times and a lower than average value is selected as the base volume change.

Claim 13. (Withdrawn): The method of claim 1, wherein the air content of the sample fluid is related to the sample volume change minus the base volume change.

Claim 14. (Withdrawn): The method of claim 1 further comprising calculating an accumulated air content of more than one sample fluids over a period of time.

Claim 15. (Withdrawn): The method of claim 14 further comprising comparing the accumulated air content to a predetermined value.

Claim 16. (Withdrawn): The method of claim 1, wherein the determining of the base volume change comprises determining a median base volume change with more than one sample of an infusion fluid.

Claim 17. (Withdrawn): The method of claim 16, wherein the determining of the median base volume change comprises determining a median base volume change with 11 contiguous samples of an infusion fluid.

Claim 18. (Withdrawn): The method of claim 16, wherein the sample fluid is a sample of the infusion fluid.

Claim 19. (Original): A method of determining pressure of a sample fluid comprising:

connecting the sample fluid to a chamber, wherein the chamber has an inlet valve, an outlet valve, and an assembly connected to a pressure source which pumps a chamber fluid out of the chamber, and wherein the sample fluid is connected to the chamber fluid through the outlet valve; and

determining chamber pressure when the pressure of the sample fluid equals the chamber pressure.

Claim 20. (Original): The method of claim 19, wherein the sample fluid is a body fluid of a mammal.

Claim 21. (Original): The method of claim 20, wherein the body fluid is blood.

Claim 22. (Original): The method of claim 20, wherein the body fluid is blood in a vessel selected from the group consisting of artery, vein, and capillary.

Claim 23. (Original): The method of claim 20, wherein the mammal is a human.

Claim 24. (Original): The method of claim 19, wherein the chamber is part of an infusion pump.

Claim 25. (Original): The method of claim 24, wherein the chamber fluid is an infusion fluid.

Claim 26. (Original): The method of claim 19, wherein the inlet valve of the chamber is closed when the pressure source pushes the chamber fluid out of the chamber.

Claim 27. (Original): The method of claim 19, wherein the assembly comprises a cassette piston.

Claim 28. (Original): The method of claim 19, wherein the pressure source comprises a motor which generates a negative pressure in the chamber and pumps the chamber fluid into the chamber, and a spring which generates a positive pressure and pumps the chamber fluid out of the chamber.

Claim 29. (Original): The method of claim 27, wherein the determination of the chamber pressure includes determining position of the piston.

Claim 30. (Original): The method of claim 28, wherein the determination of the position of the piston includes using an optical position sensor.

Claim 31. (Original): The method of claim 19 further comprising monitoring the pressure of the sample fluid including determining the pressure of the sample fluid at more than one time point over a period of time.

Claim 32. (Original): The method of claim 19 further comprising comparing the pressure of the sample fluid to a predetermined value.

Claim 33. (Withdrawn): An apparatus for air content measurement of a sample fluid comprising:

a central chamber;

an assembly moving in and out of the central chamber;

a pressure source connected to the assembly, and wherein the pressure source comprises a motor which generates a negative pressure in the central chamber and pumps

fluid into the central chamber via the assembly, and a spring which generates a positive pressure in the central chamber and pumps fluid out of the central chamber via the assembly;

a position sensor connected to the assembly, wherein the position sensor determines a position change of the assembly; and

a processor connected to the position sensor, wherein the processor receives the position change of the assembly, calculates a base volume change between zero or a negative pressure and a positive pressure in the central, and a sample volume change between zero or a negative pressure and the positive pressure in the central chamber with a sample fluid, wherein the air content of the sample fluid is related to the sample volume change minus the base volume change.

Claim 34. (Withdrawn): The apparatus of claim 33, wherein the assembly is a cassette piston.

Claim 35. (Withdrawn): The apparatus of claim 33, wherein the central chamber comprises an inlet valve and an outlet valve.

Claim 36. (Withdrawn): The apparatus of claim 35, wherein the inlet valve and the outlet valve are closed when the pressure source generates positive pressure.

Claim 37. (Withdrawn): The apparatus of claim 33, wherein the central chamber is part of an infusion pump.

Claim 38. (Withdrawn): The apparatus of claim 33, wherein the position sensor is an optical position sensor.

Claim 39. (Withdrawn): The apparatus of claim 33, wherein the processor further compares the air content to a predetermined value.

Claim 40. (Withdrawn): The apparatus of claim 39 further comprising an alarming device connected to the processor, wherein the processor activates the alarming device when the air content equals or is beyond the predetermined value.

Claim 41. (Withdrawn): The apparatus of claim 40, wherein the processor prevents fluid from leaving the central chamber when the air content equals or is beyond the predetermined value.

Claim 42. (Withdrawn): The apparatus of claim 41 further comprising an outlet valve controlling fluid flow out of the central chamber, wherein the processor closes the outlet valve and turns off the motor when the air content equals or is beyond the predetermined value.

Claim 43. (Withdrawn): The apparatus of claim 33, wherein the processor calculates the air content at different time points and generates an accumulated air content over a period of time.

Claim 44. (Withdrawn): The apparatus of claim 43, wherein the processor further compares the accumulated air content with a predetermined value.

Claim 45. (Withdrawn): The apparatus of claim 44 further comprising an alarming device connected to the processor, wherein the processor activates the alarming device when the accumulated air content equals or is beyond the predetermined value.

Claim 46. (Withdrawn): The apparatus of claim 45, wherein the processor prevents fluid from leaving the central chamber when the accumulated air content equals or is beyond the predetermined value.

Claim 47. (Withdrawn): The apparatus of claim 46 further comprising an outlet valve controlling fluid flow out of the central chamber, wherein the processor closes the outlet valve and turns off the motor when the accumulated air content equals or is beyond the predetermined value.

Claim 48. (Withdrawn): The apparatus of claim 33, wherein the processor calculates the base volume change by calculating a median base volume change of more than one sample of an infusion fluid.

Claim 49. (Withdrawn): The apparatus of claim 48, wherein the processor calculates the bases volume change by calculating a median base volume change of 11 contiguous samples of an infusion fluid.

Claim 50. (Withdrawn): The apparatus of claim 48, wherein the sample fluid is a sample of the infusion fluid.

Claim 51. (Currently amended): An apparatus for monitoring pressure of a sample fluid comprising:

a central chamber with an inlet valve and an outlet valve, wherein a sample fluid is connected to a chamber fluid in the central chamber through the ~~open~~ outlet valve.

an assembly moving in and out of the central chamber;

a pressure source connected to the assembly, and wherein the pressure source comprises a motor which generates a negative pressure in the central chamber and pumps fluid into the central chamber via the assembly, and a spring which generates a positive pressure in the central chamber and pumps fluid out of the central chamber via the assembly;

a position sensor connected to the assembly, wherein the position sensor determines a position change of the assembly; and

a processor connected to the position sensor, wherein the processor receives the position change of the assembly and calculates pressure of the central chamber when the pressure of the sample fluid equals the pressure of the central chamber.

Claim 52. (Original): The apparatus of claim 51, wherein the processor further compares the pressure of the sample fluid to a predetermined value.

Claim 53. (Original): The apparatus of claim 52 further comprising an alarming device connected to the processor, wherein the processor activates the alarming device when the pressure of the sample fluid equals or is beyond the predetermined value.

Claim 54. (Original): The apparatus of claim 52, wherein the processor prevents the fluid from leaving the central chamber when the pressure of the sample fluid equals or is beyond the predetermined value.

Claim 55. (Original): The apparatus of claim 54, wherein the processor closes the outlet valve and turns off the motor when the pressure of the sample fluid equals or is beyond the predetermined value.

Claim 56. (New): A method of determining pressure of a sample fluid comprising:

connecting the sample fluid to a chamber, wherein the chamber has an inlet valve, an outlet valve, and an assembly connected to a pressure source which assembly is operable to pump a chamber fluid out of the chamber, and wherein the sample fluid is connected to the chamber fluid through the outlet valve;

operating the assembly to pump chamber fluid out of the chamber through the outlet valve until the chamber pressure equals the pressure of the sample fluid; and

determining chamber pressure when the pressure of the sample fluid equals the chamber pressure.

Claim 57. (New): The method of claim 56, wherein the sample fluid is a body fluid of a mammal.

Claim 58. (New): The method of claim 57, wherein the body fluid is blood.

Claim 59. (New): The method of claim 57, wherein the body fluid is blood in a vessel selected from the group consisting of artery, vein, and capillary.

Claim 60. (New): The method of claim 57, wherein the mammal is a human.

Claim 61. (New): The method of claim 56, wherein the chamber is part of an infusion pump.

Claim 62. (New): The method of claim 61, wherein the chamber fluid is an infusion fluid.

Claim 63. (New): The method of claim 56, wherein the inlet valve of the chamber is closed when the assembly is operated to pump chamber fluid out of the chamber.

Claim 64. (New): The method of claim 56, wherein the assembly comprises a cassette piston.

Claim 65. (New): The method of claim 56, wherein the pressure source comprises a motor which generates a negative pressure in the chamber and pumps the chamber fluid into the chamber, and a spring which generates a positive pressure and pumps the chamber fluid out of the chamber.

Claim 66. (New): The method of claim 64, wherein the determination of the chamber pressure includes determining position of the piston.

Claim 67. (New): The method of claim 65, wherein the determination of the position of the piston includes using an optical position sensor.

Claim 68. (New): The method of claim 56 further comprising monitoring the pressure of the sample fluid including determining the pressure of the sample fluid at more than one time point over a period of time.

Claim 69. (New): The method of claim 56 further comprising comparing the pressure of the sample fluid to a predetermined value.

Claim 70. (New): The apparatus of claim 51 wherein the sample fluid is a body fluid of a mammal.

Claim 71. (New): The apparatus of claim 70 wherein the body fluid is blood.

Claim 72. (New): The apparatus of claim 70 wherein the body fluid is blood in a vessel selected from the group consisting of artery, vein, and capillary.

Claim 73. (New): The apparatus of claim 51 wherein the chamber is part of an infusion pump.

Claim 74. (New): The apparatus of claim 73 wherein the chamber fluid is an infusion fluid.